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Skills mismatch and informal sector participation among educated immigrants: evidence from South Africa

Alexandra Doyle, Amos C Peters and Asha Sundaram

Abstract

Using South African census data, we show that immigrants with tertiary education from different origin country groups differ in their likelihood of obtaining a skilled job. Immigrants from advanced country groups outperform native internal migrants, while those from many African country groups underperform them. Immigrants with advanced degrees from certain country groups are also more likely to be employed in unskilled, informal sector jobs. Variation in outcomes across origin country groups is smaller at higher levels of education. We further explore characteristics of origin country groups correlated with immigrant outcomes. Our results suggest under-utilization of immigrant skills, which has particular implications for emerging economies grappling with skills shortages.

1. Introduction

Increasing flows of migrants across international borders over the past few decades have sparked interest in immigration issues, spawning an extensive literature on both the performance and impacts of immigrants in host country labour markets[1]. Immigration can impact wages, employment, and the skills composition and diversity of the labour force. However, assimilating immigrants into the host country labour market can pose challenges. Immigrants often struggle to gain information on labour market opportunities. Employers may be uncertain about the quality of educational qualifications obtained abroad, and may hence be less likely to employ foreign-educated workers relative to their domestically-educated counterparts. Hence, immigrants with the same level of education might face inferior employment prospects relative to natives. In this paper, we look at the probability of being employed in a skilled job, and the probability of being employed in an unskilled informal sector job, conditional on post-graduate education, for immigrant groups relative to native internal migrants in a developing country, South Africa.

The established literature that looks at immigrant outcomes and the impact of immigrants on the host country labour market focuses primarily on employment and wage outcomes (Borjas, 1994; Borjas, 2003; Ottaviano and Peri, 2012). Mattoo, Neagu and Özden (2008) argue that the type of job acquired by immigrants, especially educated immigrants, is an important factor that affects their performance in the host country. They empirically show that in the US, educated immigrants from certain countries are less likely to obtain skilled jobs, providing evidence for a phenomenon called 'brain waste'. This phenomenon, where immigrant skills are under-utilised in the host country labour market, has previously been highlighted in qualitative studies (Yildiz, 2010; Bourgeault *et al.*, 2010; Carr, Inkson and Thorn, 2005).

The majority of these studies have focused on developed host countries. The literature on developing countries has hitherto focused on the phenomenon of 'brain drain', where educated migrants emigrate to advanced countries, affecting the skill composition of the labour force in the sending country (Commander, Kangasniemi and Winters, 2004). However, increasing south-south immigrant flows mean that analysing these issues for developing country markets is becoming more important[2]. Immigrant experiences and their impact on the host country are likely to be different in developing relative to developed host economies. The types of immigrants that select into immigrating to developing countries might vary from those that immigrate to advanced countries. Also, developing country labour markets are different, since they are often segmented and rigid. This means that immigrants potentially face a different set of employment options. Acknowledging these differences, Facchini, Mayda and Mendola (2012) are one of the first to examine the effect of south-south migration on developing country labour markets. Focusing on South

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[1] The stock of international migrants worldwide increased by 50 percent between 1990 and 2013 (International Migration Report, 2013, United Nations)

[2] In 2010-2013, the Africa-Africa migration corridor overtook the Latin America and the Caribbean – North America corridor, to become the third largest migration corridor in the world (International Migration Report, 2013).

Africa, they find that immigration has a negative effect on native employment, particularly for skilled workers.

To our knowledge, no study empirically explores 'brain waste' in a developing host country labour market. Our study seeks to fill this gap in the literature. We argue that developing country markets are more likely to be characterised by imperfect information, which might exacerbate difficulties related to immigrant assimilation, and might increase the likelihood of immigrants being employed in jobs that are not apt for their education or skills. A key feature of developing country labour markets is the existence of an informal sector, characterised by low quality jobs. This provides an additional avenue for 'brain waste' to occur, which we explore in this study. Further, in an environment of imperfect information, discrimination based on national origin or reputation of certain immigrant groups might be more prevalent. On the other hand, given that these countries typically face skills shortages, educated immigrants might assimilate more easily than immigrants with low levels of education, resulting in better utilisation of immigrant skills in these countries relative to more advanced host countries.

South Africa is best suited for our analysis due to a variety of reasons. South Africa is the second largest economy in Africa, has one of the highest GDPs per capita on the African continent and has attracted a diverse range of immigrants from all over Africa, the Southern African Development Community (SADC) in particular, and from the rest of the world, after the new government in 1994 de-racialised immigration policy. Immigrants in South Africa are diverse in culture, ethnicity, age and education levels, and arrive from low, middle and high income source countries. However, South Africa is characterised by high unemployment, a shortage of skills, a rigid labour market and the presence of an informal sector. While unemployment is high, graduate unemployment is approximately 5% and this is mainly associated with individuals who are in-between jobs (Altbeker & Storme, 2013).

The legacy of apartheid has meant that the country struggles with addressing concerns regarding labour market discrimination and achieving employment equity goals. South Africa also ranks high in anti-immigrant sentiment (Facchini, Mayda and Mendola, 2011). Anecdotal evidence is consistent with under-utilisation of immigrant skills. For instance, it is not rare to hear stories of immigrants from the rest of Africa working as car-guards (informal security personnel that watch over parked vehicles in public spaces), petrol station (gas station) attendants or driving taxis, despite holding teaching or other tertiary degrees. There is recognition that skilled immigrants, particularly from the rest of Africa, could provide a potential solution to South Africa's skills shortage, and there is evidence that these immigrants contribute positively to the economy. However, the literature posits that immigration policy in the post-Apartheid era remains partial to immigrants from advanced countries and hampers the utilisation of these skilled immigrants as a resource (Rasool, Botha and Bisschoff, 2012; Kalitanyi and Visser, 2010; Mattes, Crush and Richmond, 2000; Peberdy, 2001).

We employ census data for the year 2001 and find substantial variation in skilled job prospects of immigrants by country of origin. Immigrants from advanced countries have better skilled job prospects than similarly educated immigrants from developing countries. Immigrants from the rest of Africa, in particular, have lower likelihoods of obtaining skilled

jobs relative to South African native migrants. Our study also finds that among developing countries, educated immigrants from West Africa, Nigeria, DRC and Cameroon, Kenya, Ethiopia, Somalia, and Eritrea, among others have a higher probability of obtaining informal unskilled jobs relative to other developing country immigrants and South African native migrants. We also find that at higher levels of education, the dispersion of predicted probabilities of finding skilled employment across countries is much lower. When we explore potential reasons for differences in outcomes for immigrants across origin country groups, we find that immigrants coming from conflict zones or regions that generally have a high number of refugee and asylum seekers per unit immigrant stock in South Africa have much lower skilled job prospects and are much more likely to find employment in informal unskilled jobs. Immigrants from origin country groups with higher per capita GDP have higher skilled job prospects, which suggest that they probably come from the upper tail end of the ability and/or motivation distribution. Educational quality in the origin country group of the immigrant is positively correlated with skilled job prospects and inversely related to informal unskilled job prospects. English language as an official language in the immigrant's origin country group is associated with low informal unskilled job prospects among developing country immigrants to South Africa.

Our findings provide evidence for 'brain waste' and are consistent with findings for the United States in Mattoo, Neagu and Özden (2008). Such 'brain waste' can not only be damaging economically and psychologically to the immigrant himself but also to the economy, which fails to leverage available human capital (Oyelere, 2007). This is particularly relevant for developing countries, which tend to be skills-scarce. In addition, our study contributes by providing evidence for an alternative type of 'brain waste' that is likely to occur in developing country labour markets, where educated immigrants find employment in the informal sector, which is typically characterised by low worker productivity, poor working conditions, low or non-existent labour protection and uncertain job prospects. These jobs are rarely accompanied by employment benefits that increase or improve worker economic security, and are generally considered to be of lower quality[3]. The informal sector is largely characterised by elementary jobs, domestic work and agricultural labour all of which require limited amounts of education (Wills, 2009).

There are several reasons why such 'brain waste' or skills mismatch might occur among immigrant groups. We talk about five broad mechanisms. The first is immigrant assimilation. Upon arrival, immigrants are not assimilated into the local labour market, and as a result may not have the required knowledge to find a job that matches their skill set. Second, real and perceived differences in quality of schooling or training might exist for different immigrant groups based on their source country, and also for immigrants relative to the native population. This might result in differential outcomes for immigrants conditional on having the same level of education. Third, labour market policy might result in under-utilisation of immigrant skills. For instance, if accreditation of degrees or relicensing is required in sectors like health care, immigrants might be forced to seek

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[3] Employment benefits can potentially include housing (employer-provided or employer-paid), group insurance (health, dental, life etc.), disability income protection, retirement benefits, daycare, tuition reimbursement, sick leave, vacation (paid and non-paid), social security, profit sharing, funding of education, and other specialized benefits.

alternative employment while they retrain or get accreditation. Fourth, discrimination based on ethnicity or national origin, or reputations effects might affect an employer's decision to hire immigrants from certain source countries. Finally, immigrants are not a randomly selected group and are typically positively self-selected on unobserved factors like motivation and ability, which are correlated with the probability of finding a skilled job. We note here that teasing out the mechanisms through which a skills mismatch occurs in the South African labour market is beyond the scope of this study.

2. Methodology

We first estimate a logit model of the probability of obtaining a skilled job relative to an unskilled job. Hence, we estimate

$$\text{prob}(Y_i = 1) = \frac{e^{\beta_k x_i}}{1 + e^{\beta_k x_i}} \tag{2.1}$$

Here, $Y_i = 1$ for individual i if the individual is employed in a skilled job and is zero otherwise. The β_k are coefficients on right-hand side variables that capture individual characteristics including educational attainment and country group of origin. We estimate (2.1) for a sample of 30 immigrant groups, grouped by country of origin, and for native internal migrants. Since we do not have large numbers of immigrants from each origin country, we group culturally similar and geographically proximate countries into country groups. Our sample is restricted to male immigrants and natives who moved to their current South African province in the past five years. While immigrants in our sample moved from abroad, native internal migrants moved from another South African province. We exclude native migrants whose current province is their province of birth. Hence, our sample consists of recent migrants. We also restrict our sample to those immigrants whose age on arrival in South Africa indicates that they obtained their education abroad, in other words, to those who we classify 'foreign-educated'[4].

We present country groups in Table 1 and numbers of immigrants by country group in column (1) of Table 3. Studies suggest that using native-born internal migrants as the reference group when evaluating the labour market trajectories of immigrants could provide an avenue to disentangle the relative importance of selective migration in producing differences in outcomes between immigrant and native populations (Butcher 1994; Hamilton 2014; Model 2008). If immigrants are a select group, we argue that domestic internal migrants can provide a better comparison group since they too are potentially positively selected on labour market attributes. Then, the disparity in skilled job prospects between native migrants and international immigrants should be smaller than the disparity between the South African population and immigrants.

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[4] An immigrant is considered foreign educated if he moved to South Africa at an age older than that at which he would typically have completed his highest level of education. For example, an immigrant with high-school level education is considered foreign-educated if he moved to South Africa when he was 18 or older.

For our estimations, we focus on individuals who are employed, and we hence exclude unemployed immigrants and internal migrants. We also exclude individuals employed in farming activities. An individual is said to be employed in a skilled job if he reports being employed in a skilled occupation, which includes skilled workers like legislators, officers, managers, professionals and technicians. An individual is employed in an unskilled job if he reports being employed in an unskilled occupation, including clerks, service workers, shop and market sales workers, craft and related trade workers, plant and machine operators, assemblers and elementary occupations including cleaners, vendors and labourers. The independent variables, x_i, include age and age squared, indicator variables for duration or number of years in the current province (ranging from less than a year to five years), indicator variables for highest level of education obtained (no schooling, primary school, high school, undergraduate/diploma and post-graduate), a categorical variable for marital status, an indicator variable for rural or urban nature of dwelling and finally, indicator variables for country group of birth.

Age and its square are proxy variables for work experience while duration in the current province is used to approximate local labour market experience[5]. Labour market experience is important because workers tend to build up professional networks, which aids assimilation, and improves the probability of finding a job (Bourgeault *et al.*, 2010). The country dummies capture factors specific to the country of birth that are associated with the probability of being employed in a skilled job. Finally, we calculate the probabilities of immigrants and internal migrants, given their country of birth and educational attainment, obtaining a skilled job.

Next, we estimate a multinomial logit model to look at predicted probabilities of being employed in a skilled, unskilled formal and unskilled informal sector job. Hence, we allow for the dependent variable to take on multiple unordered outcomes. We can then calculate the predicted probability of each outcome. We estimate

$$\text{prob}(Y_i = j) = \frac{e^{\beta_j x_i}}{\sum_k e^{\beta_{kj} x_i}} \qquad (2.2)$$

In this model, Y_i is the dependent variable measuring the outcome for individual *i* and *j* indexes each outcome. The base outcome is obtaining an unskilled informal sector job. While we classify skilled and unskilled outcomes as in equation (2.1), we classify the individual as being employed in an informal sector job if he or she reports being employed in the informal, unregistered sector. Our sample for estimating (2.2) is the same as that for (2.1) with one difference. We do not observe immigrants from several advanced countries working in an unskilled job in the informal sector. Hence, we restrict the estimation of (2.2) to developing countries. Our independent variables remain the same. We then calculate predicted probabilities for each origin country group including native internal migrants.

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[5] Age and age squared are common proxy variables used to approximate labour force experience in the literature (Mattoo *et al.*, 2008).

Our study explores differences in the occupational and sectoral placement of similarly educated immigrants from different country groups of origin. We explore some possible explanations for these differences across groups by computing correlations between characteristics of their origin country group and the predicted probabilities of outcomes for similarly educated immigrants. Given that we do not have information on a large sample of immigrants from a wide set of countries, we are unable to perform a regression analysis. This implies that we cannot look at correlations between outcomes and each country characteristic controlling for other characteristics that also affect the outcome. The outcomes we focus on are being employed in a skilled job, obtained from our logit estimation in (2.1) and of being employed in an informal unskilled job, obtained from our multinomial logit estimation in (2.2). Since we are interested in brain waste, we refer to a high probability of obtaining a skilled job as a 'better' outcome, and a high probability of obtaining an unskilled informal sector job as a less desirable outcome.

The following variables are employed: Pupil-teacher ratio, English language (as the official language in most countries in the country group), Distance to South Africa, Military conflict (in any country in the group in the past five years), natural log of Gross Domestic Product (GDP) per capita, Proportion of asylum seekers-refugees out of total immigrants and Informality, captured by percentage self-employed. Data sources for these variables are available in Appendix A. Pupil-teacher ratio, Distance to South Africa, GDP, Proportion asylum seekers-refugees and Informality are averages across countries in the country group.

English language and Pupil-teacher ratio are included to approximate educational quality in the origin country group[6]. We expect a positive relationship between English and employment probability since immigrants from countries in which English is the spoken language will likely be preferred in South Africa where business is conducted in English. Better schooling quality is associated with better education and hence potentially better outcomes.

The remaining variables attempt to capture different dimensions of self-selection. Distance to South Africa is an approximation for the cost of migration. Immigrants that are more motivated, we conjecture, are more likely to incur the cost and thus likely to be non-randomly selected on positive characteristics. We hence anticipate a positive association between distance and outcomes. However, immigrants from distant countries might also be more likely to take up an informal sector job, rather than incur the cost of returning home. This might exert the opposite effect on the predicted probability of being employed in an informal sector job. The presence of conflict in the origin country group can be classified as a push-factor. If a country is fraught with conflict, it is more likely that people of all abilities will be willing to emigrate since conflict lowers the opportunity cost of emigration. We hence anticipate a negative relationship between conflict and outcomes. We expect that the higher the GDP per capita, higher the opportunity cost of emigration, which means that immigrants are positively self-selected, inducing a positive correlation with outcomes. Finally, we anticipate that immigrants exposed to large informal sectors

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[6] Pupil-teacher ratio has been used in a number of studies that seek to identify the impact of school quality on student performance as a proxy for quality of schooling (Bernal, Mittag & Qureshi, 2013; Branson & Leibbrandt, 2013).

before arriving in South Africa are more likely to consider it a viable and alternate employment option.

3. Data

Data on immigrants and South African internal migrants are obtained from the ten percent sample of the 2001 South African Census, available from Statistics South Africa (StatsSA). We look at foreign-educated males of working age (between 25 and 65 years of age) who moved to the current province in the five years preceding 2001. Since we look exclusively at male immigrants, we are assured that the differential probabilities of employment we observe are not driven by gender discrimination.

Figure 1 shows the distribution of immigrants in our sample by continent of origin. Almost 80% of immigrants hail from Africa. Europe and Asia follow with just over 10% and under 10% respectively. Only 2% and 1% of immigrants in our sample are from North America and Australasia respectively. Table 2, panel A shows that relative to native migrants, a larger portion of immigrants have very low or high levels of education. Most native migrants, on the other hand, report high-school level education. Hence, the distribution of immigrants has thicker tails. In panel B, we focus on employed immigrants and internal migrants in non-farming employment. We note that a much larger proportion of immigrants are employed in the informal sector than native migrants. In fact, the proportion of immigrants in the informal sector is almost two times that of internal migrants. This pattern holds if we look within the informal sector at skilled and unskilled jobs. A much larger proportion of native migrants are employed in the formal sector, relative to immigrants. Overall, the data suggest larger participation of immigrants as a whole group in the informal sector. This observation holds for all country groups but one, when, in our empirical analysis, we control for individual characteristics.

Table 3 shows the proportion of immigrants with tertiary education by origin country group. About 17% of native internal migrants report having a tertiary education. Advanced countries report significantly higher proportions of immigrants with tertiary education. South and Southeast Asia, India, Eastern Europe, North Africa, DRC and Cameroon, Kenya, Burundi, Rwanda and Uganda come next in the ranking of country groups with high proportions of immigrants with tertiary education, followed by Congo and Gabon, most of east and west Africa (except Tanzania) and South Asia. Most of southern Africa reports proportions of immigrants with tertiary education in the range of South African internal migrants, except Namibia and Botswana, which report much higher proportions. Finally, Lesotho, Mozambique and Tanzania report very low proportions of immigrants with tertiary education. Overall, it appears that advanced and middle-income countries send higher proportions of immigrants with tertiary education. With exceptions, it appears like distance to South Africa also bears some relation to the proportion of immigrants with tertiary education.

4. Results

4.1 Predicted probabilities

Table 4 presents the predicted probabilities of obtaining a skilled job by level of education and country of origin obtained from estimating equation (2.1). Overall, we observe substantial variation (by country of origin) among educated immigrants in the likelihood of finding a skilled job. For example, a 36-year-old male from Australasia, married, living in an urban location, and who has been in South Africa for one year or less, has a 94.1% chance of finding a skilled job if he has an undergraduate degree and a 98.1% chance of finding a job if he has a postgraduate degree. An otherwise identical migrant from Mozambique, however, has only a 55.5% and 79.3% of obtaining skilled employment in South Africa with undergraduate and postgraduate degrees respectively.

This example also highlights another important attribute of the results, which is that there are crude patterns of variation by geographic region and level of development. We group the immigrant's origin country groups into regions and find that generally, immigrants from advanced origin country groups have higher probabilities of obtaining skilled jobs than do immigrants from most Asian country groups, and especially when compared to African country groups.

We might expect different outcomes across origin country groups because of the varying absolute and relative costs of migrating from different regions of the world to South Africa, which might logically be related to the degree of selection of migrants on positive characteristics such as motivation. Hence, immigrant self-selection might drive these differences across origin country groups. Our correlations analysis in the next section attempts to study the role of factors driving selection, like GDP per capita, distance to South Africa and conflict in explaining variation in predicted probabilities across origin country groups. However, from Table 4, we see that even within regions that are proximate to one another, there is considerable heterogeneity in labour market outcomes. For example, in the Southern African region an immigrant from Lesotho with an undergraduate degree has a 47.3 % chance of obtaining a skilled job compared to an 80.5% chance for an immigrant from the Namibia and Botswana country group.

Similarly, focusing on advanced economies, an immigrant with an undergraduate degree from Western Europe has a 93% probability of finding a skilled job, versus an identical immigrant from Scandinavia, who has a 62% chance of finding a skilled job (the percentages are 98% and 83% respectively for immigrants with a post-graduate degree). Finally, when we focus on country groups that experienced conflict in the past five years, indicated in the table by an asterix, probabilities range from 72% for an immigrant with an undergraduate degree from Burundi, Rwanda and Uganda, to 55% for a similar immigrant from Mozambique or 63% for an immigrant from East Africa.

This suggests that variables that may drive immigrant self-selection do not explain all differences we observe in predicted probabilities of being employed in a skilled job. A second explanation is that perceived (by the employer) or real differences in quality of

education might drive these differences. We explore this idea in our correlations analysis, and find some support for it. We argue that accreditation or certification requirements, determined by policy, cannot be a significant determinant of differences in predicted probabilities across origin country groups because these, in principle, are the same for all immigrant groups. Labour market assimilation is another potential determinant. Assimilation can be aided by the presence of immigrant networks. We are unable to study assimilation in detail given that we do not employ cohort variables or an exhaustive list of duration variables in our estimation. This is due to the absence of information on time of arrival in the South African Census data.

Finally, labour market discrimination, or reputations of certain immigrant groups might explain some of the variation we see in predicted outcomes. Anecdotal evidence, case studies and surveys support the existence of xenophobia (McDonald, 2000) and a wide variation in perceptions of immigrants by country of origin in South Africa. Table 9 reports perceptions of foreign residents by South Africans based on data collected by SAMP (Southern African Migration Project), South Africa. Nigerians, Angolans, Cameroonians, and Somalis have the lowest favourability ratings of 8%, 9%, 10% and 10% respectively. Interestingly, all these country groups have a low predicted probability of obtaining a skilled job conditional on graduate or post-graduate education relative to native internal migrants. Ghanaians, Zimbabweans, and Mozambicans follow this with favourability perceptions of 11%, 12% and 14% respectively. Of all African countries, the Batswana, Basotho, and Swazi, nationalities that are culturally, ethnically, and linguistically most similar to South Africa, have the highest favourability perceptions of 35%, 39%, and 38%.

Our study also benchmarks immigrant performance by comparing immigrants from different origin country groups to South African internal migrants. Immigrants coming from most origin country groups have lower skilled job prospects than native internal migrants. In Africa, only Namibia & Botswana and North Africa outperform native migrants. Similarly, in Asia, only China and East Asia outperform native migrants. Among the advanced countries Mediterranean Europe, which are the poorer countries in Europe underperform South African internal migrants and somewhat surprisingly, Scandinavia underperforms as well.

Figure 2 shows the education-skilled employment gradients depicting predicted probabilities of occupying a skilled job among international immigrants from a few origin country groups and among South African native migrants. The positive slopes indicate that for all groups, higher education improves the probability of working in a skilled occupation. The figure also shows that there is more variation among origin country groups in skilled job prospects at lower levels of education than at higher levels of education. The implication is that an immigrant's origin country group matters relatively more for determining the probability of obtaining skilled employment if that immigrant has an undergraduate education versus if he has postgraduate education. This might be expected in an emerging, skills-scarce host economy like South Africa, where a high level of education is greatly valued, compensating for factors that might depress an immigrant's chances of finding a skilled job. Figure 2 also highlights key underperformers: West Africa, Lesotho, Mozambique, Kenya, and Nigeria, and certain over performers: UK & Ireland, Namibia & Botswana, and China.

Tables 5-6 report the predicted probabilities of finding skilled jobs, formal unskilled jobs, and informal unskilled jobs for immigrants from developing origin country groups, obtained from the estimation of equation (2.2). There are very few instances where developed country immigrants take up employment in the informal sector so this study excludes these groups, considering developing countries. These results show that immigrants from some developing regions have substantial involvement in the informal sector. For example, male migrants from West Africa with undergraduate degrees, have a 19% chance of being employed in an unskilled informal sector job. South African native migrants have a 1.4% chance of occupying an unskilled informal sector job. Nigeria, Kenya, East Africa, DRC & Cameroon are among the African countries that exhibit high informal sector participation. Table 5 also shows that immigrants from India and Pakistan with undergraduate degrees have 6% and 6.9% chance of being employed in an informal unskilled job.

Table 6 examines immigrants with postgraduate degrees and finds the same basic trends with reduced probabilities of being employed in the informal sector. We find that with a post-graduate degree, immigrants from West African countries have as high as a 7% chance of obtaining an unskilled informal sector job, while this percentage is almost zero for native internal migrants. Figure 3 presents education-informal unskilled employment gradients depicting predicted probabilities of occupying an informal unskilled job among developing country immigrants and South African native migrants. The trend is similar to that in Figure 2. The negative slopes indicate that for all groups, higher education reduces the probability of working in an informal unskilled occupation. Also, probabilities converge at higher levels of education.

4.2 Correlations analysis

The results reported in Tables 4-6, demonstrate that after accounting for observable demographic and socioeconomic characteristics, similarly educated migrants from different origin country groups have highly varied prospects for attaining skilled jobs. Moreover, immigrants from a significant number of origin country groups display high propensities to work in informal unskilled jobs. In this section, we correlate characteristics of origin country groups with predicted probabilities to look for potential explanations for this variation in outcomes across country groups.

Table 7 reports the full sample correlations between the predicted probabilities of similarly educated immigrants finding skilled jobs and characteristics of their origin country groups. For both education categories, the presence of military conflict in the origin country group in the past five years as well as GDP per capita are the most substantive correlates with the probability of finding a skilled job. GDP per capita has a positive correlation of 0.53 and 0.51 for undergraduate and postgraduate respectively, whereas military conflict has a negative correlation of -0.50 and -0.53. This result tentatively suggests that higher GDP per capita improves immigrant quality and that military conflicts reduce immigrant quality. Similar to military conflict, the proportion of refugees and asylum seekers to immigrant stock is negatively correlated with the predicted probability of finding a skilled job. Distance to South Africa has a weak but positive correlation (0.28 and 0.26) with the predicted

probability, which implies that the further an immigrant's country of birth is from South Africa, the higher the probability of finding skilled employment.

The pupil-teacher ratio is a measure of educational quality and has a moderate correlation of -0.38 and -0.35 with the probability of finding a skilled job for immigrants with undergraduate and postgraduate education respectively. This suggests that higher quality education in the origin country group (as depicted by a lower pupil-teacher ratio) is associated with higher chances of immigrants attaining skilled jobs. English language is not correlated with the predicted probability of obtaining a skilled job.

Table 8 reports sample correlations for developing countries between the predicted probabilities of similarly educated immigrants finding either skilled, formal unskilled, or informal unskilled jobs and their country of origin characteristics. We wish to highlight the correlates of informal sector participation. As expected, for immigrants with undergraduate education, military conflict in the origin country and asylum-refugee to immigrant stock ratio are strongly and positively correlated with informal sector participation at 0.51 and 0.42 respectively. GDP per capita is negatively correlated with the predicted probability of informal unskilled job acquisition (-0.39). Distance to South Africa, however, is highly correlated with the predicted probability of an immigrant being employed in an informal unskilled job (0.57). This could suggest that because the absolute and relative costs of migration are high for such migrants, return migration to their origin countries is less likely. A logical outcome of this would be that these educated immigrants are likely to seek work in any sector they can to support themselves. Immigrants who cannot afford to return home will accept informal sector employment rather than remaining unemployed.

Table 8 shows that the pupil-teacher ratio and informal sector presence are not correlated with the predicted probability of informal unskilled employment. In contrast to table 7, English language is highly negatively correlated with immigrant informal sector participation for immigrants with undergraduate (-0.57) and postgraduate (-0.53) education. Immigrants coming from origin country groups that do not have English as an official language are much more likely to take up unskilled employment in the informal sector.

To summarise our results, we find substantial variation in skilled jobs prospects of immigrants by country of origin. In general, similarly educated immigrants from advanced countries have higher skilled job prospects than similarly educated immigrants from developing countries. Immigrants from the rest of Africa in particular have lower likelihoods of obtaining skilled jobs relative to South African native migrants. Our study also finds that among developing countries, similarly educated immigrants from West Africa, Nigeria, DRC and Cameroon, Kenya, Ethiopia, Somalia, and Eritrea, among others have a higher probability of obtaining informal unskilled jobs relative to other developing country immigrants and South African native migrants. We also find that the variation in probabilities of attaining skilled jobs is lower at higher levels of education which suggests that at higher levels of education, country of origin is less important in determining occupational placement or, alternatively stated, brain waste among immigrants is reduced at higher levels of education.

We conclude that even after controlling for a range of observable individual characteristics, there is considerable variation in skilled job prospects among immigrants to South Africa. As discussed earlier in this section, there are several potential reasons for the existence of skills mismatch among immigrants to South Africa. Our study attempts a preliminary and exploratory explanation of this variation by looking at correlates to these skilled job prospects. The findings indicate that immigrants coming from conflict zones, or origin country groups that generally have a high number of refugee and asylum seekers per unit immigrant stock in South Africa, have much lower skilled job prospects and are much more likely to find employment in informal unskilled jobs. Origin country groups such as Angola, Mozambique, Burundi, Rwanda and Uganda, and East Africa had military conflicts in the five-year period preceding 2001. Return possibilities for these migrants are likely very low.

Immigrants from origin country groups with higher per capita GDP have higher skilled job prospects, which suggest that they probably come from the upper tail end of the ability and/or motivation distribution. Educational quality in the immigrant's origin country group is positively correlated with skilled job prospects and inversely related to informal unskilled job prospects. English language as an official language in the immigrant's origin country group is associated with low informal unskilled job prospects among developing country immigrants to South Africa. Although a measure of the size of the informal sector in the immigrant's origin country group is positively correlated with informal unskilled job prospects, our study finds that this correlation is weak.

5. Conclusion

Our study examines the relationship between country of origin, education, and skilled job prospects for migrants to South Africa, an emerging host country. We also focus on developing countries by examining how the first two factors relate to informal sector participation. In particular we look for evidence for a phenomenon called 'Brain Waste' in the migration literature which can be defined to be a type of skills mismatch induced by migrating across national boundaries. We argue that focusing on a developing country like South Africa which suffers from chronic unemployment and a rigid labour market can provide valuable insights into how immigrants assimilate into more rigid developing country labour markets. It can also help to inform policy to reduce and minimise 'brain waste' and make immigration more effective as an instrument for growth and development.

This research has important policy implications for addressing the under-utilisation of human capital and developing policy to aid the integration of immigrants into the labour market. Most importantly, evidence of 'brain waste' calls for policies to reduce barriers to labour market entry for immigrants. This is particularly necessary in the context of developing economies with skills shortages. Efforts to improve access to information on education systems and premier educational institutions in foreign countries for employers can also help better matching between employers and immigrant workers, resulting in appropriate utilisation of immigrant skills. However, policy proposals to address the lack of recognition of foreign earned human capital require global cooperation to establish internationally recognised standards and quality accreditation procedures. For example, throughout Europe, the Bologna Process has sought to ensure that degrees obtained

throughout the continent are recognised by employers in the European common market (Raghuram, 2008). Finally, policies that aim to integrate immigrants into the labour market can result in positive spillover effects from immigrants to the general workforce, resulting in improved productivity.

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http://www.wes.org/community/evaluation/ForeignCredentialRecognitionUS.pdf [2013, 17 August].

Table 1: Country groups

Country group	List of countries
Southern Africa	
Lesotho	Lesotho
Namibia & Botswana	Namibia & Botswana
Zimbabwe	Zimbabwe
Mozambique	Mozambique
Swaziland	Swaziland
Angola	Angola
Malawi & Zambia	Malawi & Zambia
Central Africa	
DRC & Cameroon	Democratic Republic of Congo & Cameroon
Congo & Gabon	Congo & Gabon
East Africa	
Tanzania	Tanzania
Burundi, Rwanda, Uganda	Burundi, Rwanda & Uganda
Kenya	Kenya
East Africa	Eritrea, Ethiopia, Somalia & Sudan
West Africa	
Nigeria	Nigeria
West Africa	Ghana, Benin, Cote d'Ivoire, Sierra Leone, Liberia & Senegal
North Africa	Algeria, Libya, Egypt, Iran, Israel, Jordan, Lebanon, Turkey & Morocco
East and Southeast Asia	
China	China and Hong Kong
East Asia	Japan, South Korea, North Korea & Taiwan
Southeast Asia	Malaysia, Philippines, Singapore & Indonesia
South Asia	
Bangladesh, Nepal & Sri Lanka	Bangladesh, Nepal & Sri Lanka
India	India
Pakistan	Pakistan
Eastern Europe	Bulgaria, Croatia, Russia, Poland, Slovakia, Macedonia, Yugoslavia & Ukraine
Advanced countries	
North America	United States of America & Canada
UK & Ireland	United Kingdom & Ireland
Scandinavia	Denmark, Finland, Netherlands, Norway & Sweden
Western Europe	France, Belgium & Switzerland
Germany & Austria	Germany & Austria
Mediterranean Europe	Portugal, Italy, Greece, Spain & Cyprus
Australasia	Australia & New Zealand

Table 2: Description of data by sample

	Immigrants	Internal migrants
Panel A: Distribution by Educational Attainment		
No Schooling	13.2%	6.9%
Primary School	17.6%	18.7%
High School (Matric equivalent)	44.6%	57.3%
Undergraduate Degree or Diploma	16.0%	13.7%
Masters or Doctorate Degree	8.7%	3.3%
Panel B: Distribution by Occupation Type		
Formal Sector:	77.4%	88.3%
- Unskilled Worker	50.1%	59.3%
- Skilled Worker	27.3%	29.0%
Informal Sector:	22.6%	11.7%
- Unskilled Worker	19.8%	10.1%
- Skilled Worker	2.8%	1.6%

Notes: In Panel B, we focus on employed individuals in non-farming activities.
Source: South African census 2001 and authors' calculations.

Table 3: Percentage of tertiary educated immigrants by country group

Country group	Number of immigrants: 1996-2001	Tertiary education (%)
South Africa-Internal migrants	45,276	17.0
Southern Africa		
Lesotho	649	2.8
Namibia & Botswana	110	35.5
Zimbabwe	377	18.0
Mozambique	863	1.3
Swaziland	85	14.1
Angola	64	20.3
Malawi & Zambia	339	21.8
Central Africa		
DRC & Cameroon	57	45.6
Congo & Gabon	103	34.0
East Africa		
Tanzania	32	6.3
Burundi, Rwanda & Uganda	47	46.8
Kenya	35	51.4
East Africa	44	34.1
West Africa		
Nigeria	186	33.9
West Africa	69	29.0
North Africa	33	57.6
East and Southeast Asia		
China	31	45.2
East Asia	46	60.9
Southeast Asia	9	55.6
South Asia		
Bangladesh, Nepal & Sri Lanka	18	38.9
India	81	51.9
Pakistan	86	22.1
Eastern Europe	34	61.8
Advanced countries		
North America	64	82.8
UK & Ireland	213	71.4
Scandinavia	22	81.8
Western Europe	38	76.3
Germany & Austria	114	68.4
Mediterranean Europe	38	60.5
Australasia	32	78.1

Source: South African census 2001 and authors' calculations.

Table 4: Probability of obtaining skilled jobs-different education levels

Country group	Undergraduate (%)	Postgraduate (%)
South Africa-Internal migrants	73.6	89.6
Southern Africa		
Lesotho	47.3	73.5
Namibia & Botswana	80.5	92.7
Zimbabwe	73.4	89.5
Mozambique*	55.3	79.3
Swaziland	63.2	84.1
Angola*	68.4	87.0
Malawi & Zambia	68.0	86.7
Central Africa		
DRC & Cameroon	53.1	77.8
Congo & Gabon	57.2	80.5
East Africa		
Tanzania	76.8	91.1
Burundi, Rwanda & Uganda*	72.1	88.9
Kenya	66.9	86.2
East Africa*	62.8	83.9
West Africa		
Nigeria	65.7	85.5
West Africa	42.9	69.9
North Africa	93.5	97.8
East and Southeast Asia		
China	78.5	91.9
East Asia	84.9	94.6
Southeast Asia	48.6	74.5
South Asia		
Bangladesh, Nepal & Sri Lanka	65.8	85.6
India	73.0	89.3
Pakistan	54.8	78.9
Eastern Europe	74.6	90.1
Advanced countries		
North America	73.9	89.7
UK & Ireland	89.8	96.5
Scandinavia	61.8	83.3
Western Europe	92.7	97.5
Germany & Austria	79.0	92.1
Mediterranean Europe	67.6	86.6
Australasia	94.4	98.1

Note: *Indicates a conflict zone.

Table 5: Probability of developing country immigrants with undergraduate degrees obtaining skilled, formal unskilled and informal unskilled jobs

Country group	Skilled	Formal unskilled	Informal unskilled
South Africa-Internal migrants	73.6	25.0	1.4
Southern Africa			
Lesotho	47.6	49.2	3.2
Namibia & Botswana	80.3	18.7	1.0
Zimbabwe	76.5	19.5	4.0
Mozambique	56.6	40.0	3.4
Swaziland	62.8	35.6	1.6
Angola	71.3	24.0	4.7
Malawi & Zambia	69.5	26.7	3.8
Central Africa			
DRC & Cameroon	55.7	36.4	7.8
Congo & Gabon	58.5	36.9	4.6
East Africa			
Tanzania	77.8	20.5	1.8
Burundi, Rwanda & Uganda	73.5	21.9	4.6
Kenya	69.4	19.0	11.7
East Africa	68.2	21.7	10.2
West Africa			
Nigeria	69.6	20.5	9.9
West Africa	46.3	34.7	19.0
South Asia			
Bangladesh, Nepal & Sri Lanka	67.5	29.0	3.4
India	74.8	19.1	6.0
Pakistan	56.5	36.6	6.9

Table 6: Probability of developing country immigrants with postgraduate degrees obtaining skilled, formal unskilled and informal unskilled jobs

Country group	Skilled	Formal unskilled	Informal unskilled
South Africa-Internal migrants	89.7	9.9	0.4
Southern Africa			
Lesotho	74.0	24.8	1.2
Namibia & Botswana	92.7	7.0	0.3
Zimbabwe	91.3	7.5	1.2
Mozambique	80.4	18.4	1.2
Swaziland	84.1	15.4	0.5
Angola	88.9	9.7	1.4
Malawi & Zambia	87.9	10.9	1.2
Central Africa			
DRC & Cameroon	80.3	17.0	2.7
Congo & Gabon	81.7	16.7	1.6
East Africa			
Tanzania	91.7	7.8	0.5
Burundi, Rwanda & Uganda	90.0	8.7	1.4
Kenya	88.5	7.8	3.6
East Africa	87.8	9.0	3.2
West Africa			
Nigeria	88.5	8.4	3.1
West Africa	74.5	18.0	7.4
South Asia			
Bangladesh, Nepal & Sri Lanka	86.8	12.1	1.1
India	90.7	7.5	1.8
Pakistan	80.7	16.9	2.4

Table 7: Correlations--Skilled employment (all Countries)

Probability of obtaining skilled employment	Undergraduate			Postgraduate		
	Skilled	Formal	Informal	Skilled	Formal	Informal
Informality	-0.18	0.12	0.16	-0.16	0.13	0.15
Distance to South Africa	-0.13	-0.16	0.57	-0.07	-0.11	0.53
Military conflict	-0.55	0.37	0.51	-0.52	0.43	0.49
Asylum/Refugee	0.07	-0.31	0.42	0.13	-0.27	0.33
English	0.07	0.23	-0.57	0.03	0.16	-0.53
GDP	0.20	-0.02	-0.39	0.17	-0.07	-0.34
Pupil teacher ratio	0.12	-0.28	0.25	0.18	-0.27	0.16

Table 8: Correlations--Skilled employment (developing countries)

Probability of obtaining skilled employment	Undergraduate	Postgraduate
Distance to South Africa	0.28	0.26
Military conflict	-0.50	-0.53
Asylum/Refugee	-0.24	-0.21
English	0.04	0.04
GDP	0.53	0.51
Pupil teacher ratio	-0.38	-0.35

Table 9: South African perceptions of foreign residents by national origin

Favourable (%)	Whites	Blacks	Coloureds	Asians/Indians	Total
Nigerians	11	8	4	9	8
Angolans	14	9	5	7	9
Batswana	29	40	14	23	35
People from DRC	15	10	5	6	10
Ghanaians	16	12	4	9	11
Basotho	27	46	17	23	39
Mozambicans	13	15	9	11	14
Somalis	9	10	5	17	10
Swazi	24	44	18	32	38
Zimbabweans	12	13	9	11	12

Source: Southern African Migration Project

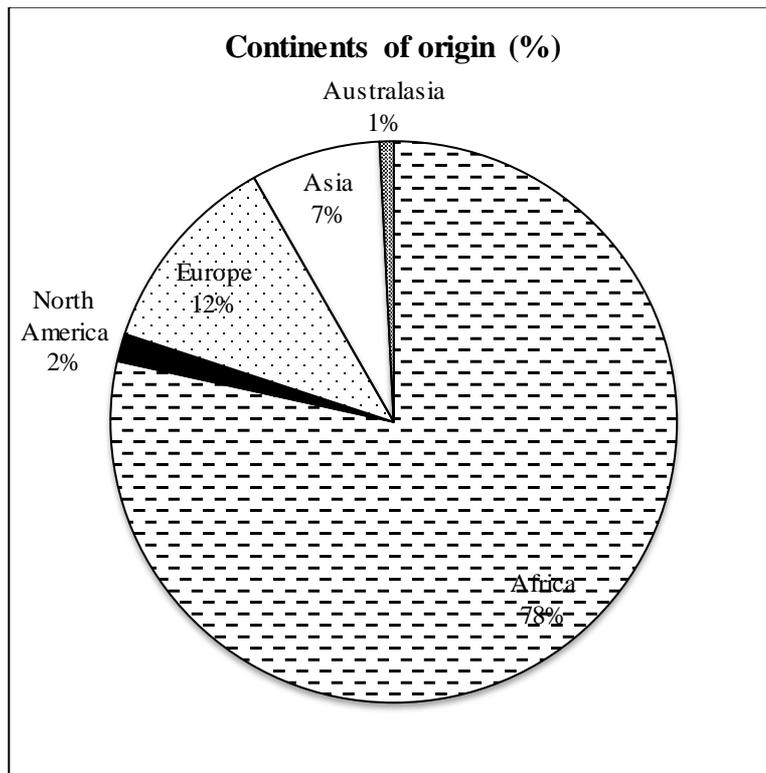**Figure 1: Continents of origin – Immigrant sample**

Continents of origin (%)

Figure 2: Education-skilled employment gradients depicting predicted probabilities of occupying a skilled job
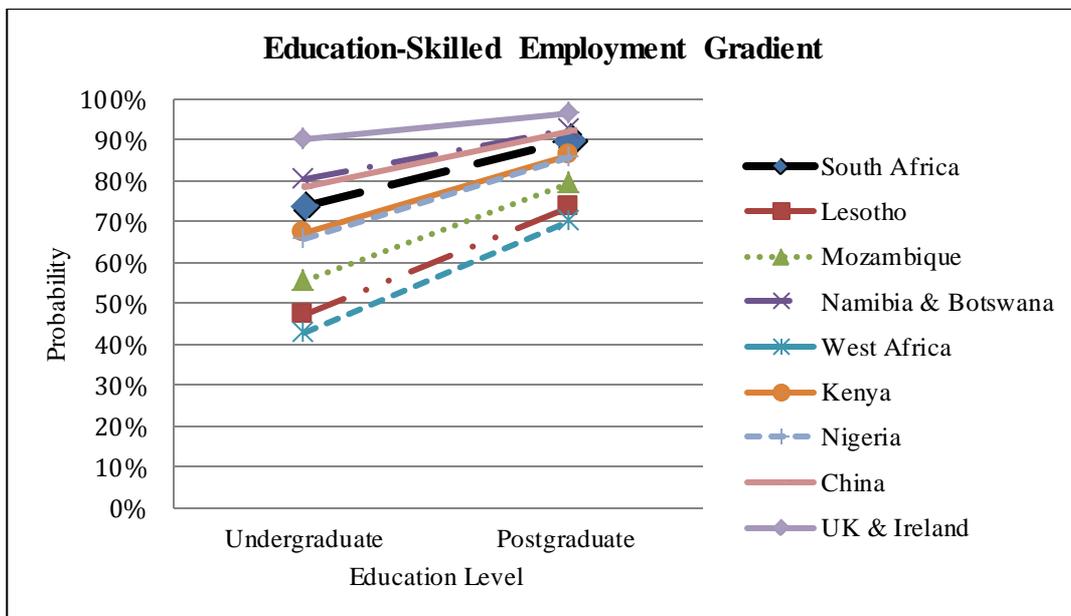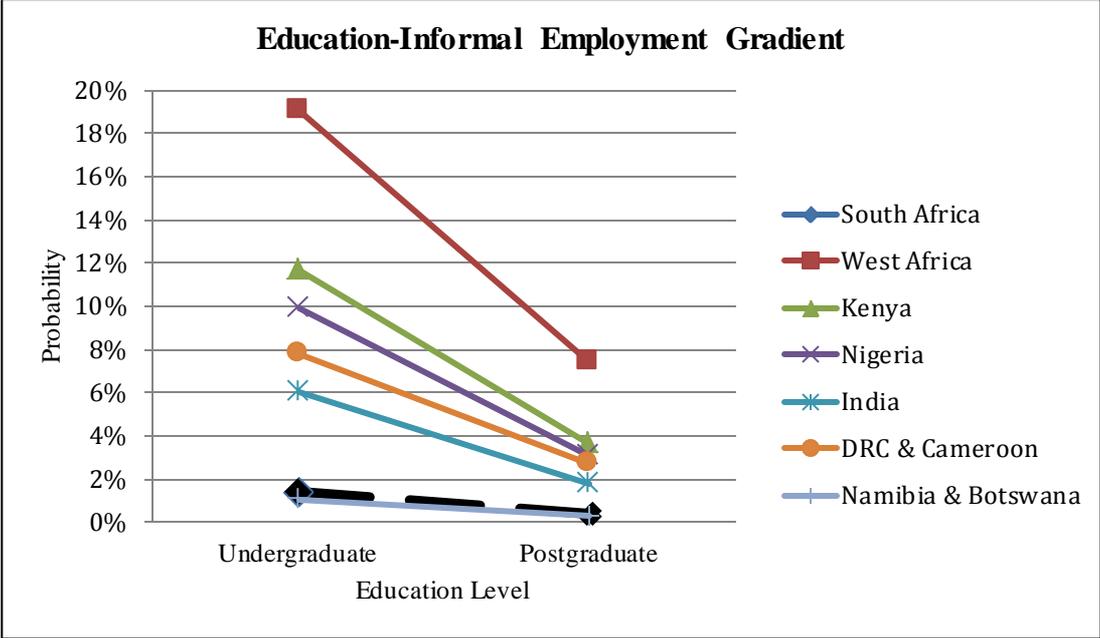

Education-Skilled Employment Gradient

Figure 3: Education-informal unskilled employment gradients depicting predicted probabilities of occupying an informal unskilled job

Appendix A

Variable	Definition	Source
(log) Distance to South Africa	Kilometres between capital city of immigrant source country and South Africa	CEPII's Distance Measures
Informality	% of the active labour force self-employed	La Porta and Schleifer (2008), accessed at http://faculty.tuck.dartmouth.edu/rafael-laporta/research-publications
Refugee Applications	Ratio of refugees and asylum seekers to total immigrant stock in 2000	United Nations Commission for Refugees
Military conflict	A dummy variable which takes on the value 1 if there was military conflict in the home country during 1996-2001	Variable constructed using www.prio.no, version 2.1 of the "Armed Conflict" database initiated by Gleditsch, Wallensteen, Eriksson, Sollenberg and Strand (2002)
English	English as an official language– dummy variable with value 1 if English is the official spoken language	CIA - The World Factbook, 2014.
Pupil-Teacher ratio	Number of pupils to teachers in an average class, 2001	World Development Indicators.
(log) GDP per capita	per capita GDP adjusted for PPP, 2001	World Development Indicators.

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Reviewer Table 1: Logit regression output

Dependent Variable equals one if employed in a skilled job (relative to zero if employed in an unskilled job)	Coefficient	Z
Duration: 1 year	0.05	1.25
Duration: 2 years	-0.08	-1.77
Duration: 3 years	-0.06	-1.35
Duration: 4 years	-0.09	-1.85
Duration: 5 years	-0.06	-0.81
Dwelling: Urban/Rural (Urban = 1)	0.11	2.21
Marital Status (Categorical)	-0.12	-14.79
Age	0.05	3.64
Age squared	-0.0003	-2.12
Education - Primary schooling	-0.35	-3.42
Education - High school	1.16	13.56
Education - Undergraduate/Diploma	3.08	34.49
Education - Post-graduate	4.21	36.95
Code 2: Lesotho	-1.14	-5.00
Code 3: Namibia & Botswana	0.39	1.19
Code 4: Zimbabwe	-0.01	-0.06
Code 5: Mozambique	-0.81	-4.48
Code 6: Swaziland	-0.49	-1.28
Code 7: Angola	-0.25	-0.51
Code 8: DRC & Cameroon	-0.90	-1.51
Code 9: Congo & Gabon	-0.74	-2.23
Code 10: Malawi & Zambia	-0.28	-1.60
Code 11: Tanzania	0.17	0.30
Code 12: North Africa	1.63	3.00
Code 13: Burundi, Rwanda, Uganda	-0.08	-0.19
Code 14: East Africa	-0.50	-0.92
Code 15: West Africa	-1.31	-3.14
Code 16: Kenya	-0.32	-0.60
Code 17: Nigeria	-0.38	-1.55
Code 18: North America	0.01	0.03
Code 19: China	0.27	0.55
Code 20: Bangladesh, Nepal & Sri Lanka	-0.37	-0.53
Code 21: India	-0.03	-0.11
Code 22: East Asia	0.70	1.63
Code 23: South East Asia	-1.08	-1.33
Code 24: Pakistan	-0.83	-2.22
Code 25: UK and Ireland	1.15	4.87
Code 26: Eastern Europe	0.05	0.10
Code 27: Scandinavia	-0.55	-0.94
Code 28: Western Europe	1.51	2.18
Code 29: Germany & Austria	0.30	1.00
Code 30: Mediterranean Europe	-0.29	-0.67
Code 31: Australasia	1.80	2.71
Constant	-3.35	-12.02

Notes: Number of observations = 31,884.

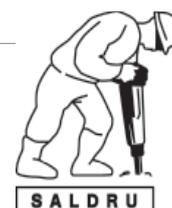**Reviewer Table 2: Multinomial Logit regression output**

	Outcome 1: Skilled employment		Outcome 2: Formal Unskilled employment	
	Coefficient	Z	Coefficient	Z
Duration: 1 year	0.06	0.86	0.004	0.055
Duration: 2 years	-0.04	-0.64	0.036	0.059
Duration: 3 years	-0.06	-0.83	-0.002	0.060
Duration: 4 years	-0.04	-0.61	0.050	0.062
Duration: 5 years	-0.06	-0.51	-0.015	0.099
Dwelling: Urban/Rural (Urban = 1)	0.63	9.86	0.623	0.049
Marital Status (Categorical)	-0.23	-18.30	-0.121	0.011
Age	0.14	7.03	0.105	0.017
Age squared	-0.0014	-5.82	-0.001	0.000
Education - Primary schooling	-0.39	-3.41	-0.054	0.070
Education - High school	1.65	16.20	0.584	0.068
Education - Undergraduate/Diploma	4.12	31.31	1.172	0.109
Education - Post-graduate	5.53	17.30	1.458	0.318
Code 2: Lesotho	-1.28	-4.93	-0.169	0.147
Code 3: Namibia & Botswana	0.42	0.72	0.047	0.551
Code 4: Zimbabwe	-1.02	-4.85	-1.306	0.162
Code 5: Mozambique	-1.14	-5.68	-0.412	0.109
Code 6: Swaziland	-0.28	-0.55	0.227	0.391
Code 7: Angola	-1.25	-2.10	-1.262	0.436
Code 8: DRC & Cameroon	-2.00	-2.91	-1.350	0.446
Code 9: Congo & Gabon	-1.42	-3.41	-0.801	0.314
Code 10: Malawi & Zambia	-1.05	-4.84	-0.927	0.167
Code 11: Tanzania	-0.18	-0.25	-0.438	0.576
Code 13: Burundi, Rwanda, Uganda	-1.20	-2.15	-1.330	0.504
Code 14: East Africa	-2.06	-3.36	-2.131	0.428
Code 15: West Africa	-3.07	-6.59	-2.284	0.308
Code 16: Kenya	-2.18	-3.31	-2.399	0.619
Code 17: Nigeria	-2.02	-7.05	-2.164	0.234
Code 20: Bangladesh, Nepal & Sri Lanka	-0.99	-1.11	-0.755	0.699
Code 21: India	-1.45	-3.70	-1.730	0.359
Code 24: Pakistan	-1.87	-4.14	-1.224	0.314
Constant	-3.64	-8.95	-0.870	0.339

Notes: 1) Number of observations = 31,396. 2) Base outcome: Informal unskilled employment.

southern africa labour and development research unit

The Southern Africa Labour and Development Research Unit (SALDRU) conducts research directed at improving the well-being of South Africa's poor. It was established in 1975. Over the next two decades the unit's research played a central role in documenting the human costs of apartheid. Key projects from this period included the Farm Labour Conference (1976), the Economics of Health Care Conference (1978), and the Second Carnegie Enquiry into Poverty and Development in South Africa (1983-86). At the urging of the African National Congress, from 1992-1994 SALDRU and the World Bank coordinated the Project for Statistics on Living Standards and Development (PSLSD). This project provide baseline data for the implementation of post-apartheid socio-economic policies through South Africa's first non-racial national sample survey.

In the post-apartheid period, SALDRU has continued to gather data and conduct research directed at informing and assessing anti-poverty policy. In line with its historical contribution, SALDRU's researchers continue to conduct research detailing changing patterns of well-being in South Africa and assessing the impact of government policy on the poor. Current research work falls into the following research themes: post-apartheid poverty; employment and migration dynamics; family support structures in an era of rapid social change; public works and public infrastructure programmes, financial strategies of the poor; common property resources and the poor. Key survey projects include the Langeberg Integrated Family Survey (1999), the Khayelitsha/Mitchell's Plain Survey (2000), the ongoing Cape Area Panel Study (2001-) and the Financial Diaries Project.